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MANNED SPACE
FLIGHT**

APOLLO APPLICATIONS PROGRAM

REFERENCE COPY

PROGRAM DIRECTIVE NO. 6

FLIGHT MISSION DIRECTIVE FOR AAP-IA



**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON D. C. 20546**

APOLLO APPLICATIONS
PROGRAM DIRECTIVE NO. 6

TO : Distribution

FROM:

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DIRECTOR, SAA PROGRAM

SUBJECT: Flight Mission Directive for Mission AAP-1A

REF : (a) Apollo Applications Flight Mission Assignments Directive
(to be revised)
(b) Apollo Applications Planning Schedule ML-6 dated 5/24/67
(c) Apollo Flight Mission Assignments Directive (to be revised)
(d) Apollo Test Requirements, NHB 8080.1, dated March 1967
(e) Apollo Program Directive No. 6A dated 8/30/66
(f) Apollo Program Directive No. 15 dated 1/25/66
(g) Reliability and Quality Assurance Plan, NHB 5300.5, dated
May 1967

PURPOSE: This Directive defines AAP requirements and responsibilities to initiate those actions prerequisite to execution of the AAP-1A Mission authorized in reference (a). The mission is scheduled for launch as indicated in reference (b) in the event that the launch vehicles and spacecraft assigned to the Apollo-Saturn missions, reference (c), are not required to support the mainline Apollo Program.

1.0 MISSION PURPOSE

The purpose of the AAP-1A Mission is to perform experiments in space sciences and advanced technology in a low altitude, earth orbit for a period of up to 14 days.

2.0 MISSION OBJECTIVES

2.1 Primary Objective: The primary objective of Mission AAP-1A is listed below. It may be amplified but not modified by the centers. Preflight

malfunctions of spacecraft or launch vehicle systems, ground equipment or instrumentation which would result in failure to meet this objective, will be cause to hold or cancel the mission until the malfunction has been eliminated.

Conduct experiments in the areas of space science and advanced technology. (This applies to mission experiments as a group. Individual experiments within this group are classed as secondary objectives as shown in paragraph 2.2 below.)

- 2.2 Secondary Objectives: The secondary objectives of Mission AAP-1A are summarized below. Preflight malfunctions of spacecraft or launch vehicle systems, ground equipment or instrumentation which would result in failure to meet these objectives may be cause to hold or cancel the mission as specified in the Mission Rules.
- a. Obtain technological data needed for development of advanced spacecraft and equipment (Experiments T002, T003, D017).
 - b. Obtain data to develop a more complete understanding of the physical characteristics of the extra-atmospheric environment (Experiments S016, S017, S018, S063).
 - c. Obtain biological data as required for evaluation of the effects of weightlessness on man (Experiments T004, S015).
 - d. Obtain stellar and solar astronomy data (Experiments S019, S020).
 - e. Obtain data prerequisite to identification of earth resources and development of improved cartographic procedures (Experiments S005, S006, S065 - additional earth resources experiments will be considered for inclusion in support of this objective).

3.0 GENERAL FLIGHT PLAN

- 3.1 Launch Vehicle Powered Flight: AAP-1A is a manned flight involving an Up-rated Saturn I launch vehicle and an Apollo Block II CSM. It will be launched from LC-34 at KSC to effect an orbital inclination of at least 35° (actual inclination under study) at an altitude of 81/120 n. mi.
- 3.2 Spacecraft Flight Profile: The AAP-1A spacecraft will be injected initially in an 81/120 n. mi. orbit. The CSM will then separate from the SLA and the spacecraft SPS will be used to circularize the orbit

at approximately 140 n. mi. altitude (exact altitude to be determined). Total mission duration will be open ended to 14 days during which space science and advanced technology experiments will be conducted.

- 3.3 EVA Requirements: The advisability of conducting EVA to support additional experiments or to evolve new techniques or improved procedures for application to future AAP missions will be investigated. Specific requirements and scope of EVA will be included in subsequent issues of this directive if studies indicate that this activity would be compatible with the proposed experimental program, feasible in the time frame under consideration and beneficial to follow-on AAP missions.
- 3.4 Recovery: Water recovery to be developed for the CM consistent with the above-stated profile characteristics and the normal recovery constraints associated with the deployment of recovery forces and the local lighting conditions at the time of recovery.
- 3.5 Mission Support Requirements: These requirements will be supplied in a "Program Support Requirements" document to be issued by the Operations Support Office, Mission Operations, OMSF, not later than four months prior to launch.

4.0 CONFIGURATION

- 4.1 Launch Vehicle: The AAP-1A launch vehicle will be an Up-rated Saturn I, as specified in references (a) and (b), modified only as necessary to accomplish mission objectives.
- 4.2 Spacecraft: The AAP-1A spacecraft will be a basic Apollo Block II CSM modified to:
- a. Carry the Apollo Scientific Airlock.
 - b. Support experiment transport to orbit, execution and data recovery.

5.0 EXPERIMENTS

The experiments which are currently under consideration for execution on AAP-1A are identified below. Additional earth resources experiments will be

considered for inclusion. Firm assignments will be made in subsequent issues of this directive when compatibility studies are complete.

<u>Exp. No.</u>	<u>Title</u>	<u>Development Center</u>
<u>Technology</u>		
T002	Manual Navigation Sightings	ARC/MSC
T003	In-flight Nephelometer	ERC/MSC
T004	Frog Otolith Function	ARC/MSC
<u>Science</u>		
S005	Synoptic Terrain Photography	MSC
S006	Synoptic Weather Photography	MSC
S015	Zero-G Single Human Cells	MSC
S016	Trapped Particles Asymmetry	MSC
S017	X-ray Astronomy	MSC
S018	Micrometeoroid Collection	MSC
S019	UV Stellar Astronomy	MSC
S020	UV/X-ray Solar Photography	MSC
S063	UV Airglow Horizon Photography	MSC
S065	Multi-band Terrain Photography (Hand Held)	MSC
<u>Department of Defense</u>		
D017	Carbon Dioxide Reduction	AF/MSC

6.0 SUPPORTING GROUND TEST CONSTRAINTS

Test program will be conducted in accordance with NHB 8080.1 (reference (d)) as modified by the Apollo Applications Test Requirements document (to be issued) and appropriate test specifications. Mission Requirements documents prepared by the centers in support of these missions will identify by inclusion or reference the test constraints which must be lifted prior to mission execution.

- 6.1 Qualification: Components of the spacecraft, launch vehicles, flight experiment hardware and associated support systems whose failure would jeopardize either crew safety (Category I) or the accomplishment of a

primary mission objective (Category II) and which have not been flight tested will be ground qualified and/or certified prior to launch. Basic Apollo hardware which has been flight tested (i.e., CSM) will be subjected to additional ground qualification and/or certification tests as required to provide confidence in meeting pertinent AAP requirements.

6.2 Launch Vehicle: The following flight stage and acceptance tests will be performed:

- a. Manufacturing checkout of the IU and S-IB and S-IVB flight stages.
- b. Static test of the S-IB and S-IVB flight stages.
- c. Post static checkout of the S-IB and S-IVB flight stages.
- d. KSC inspection tests of the IU and S-IB and S-IVB flight stages.

6.3 AAP Experiments: The following ground tests will be performed:

- a. Qualification tests for each experiment.
- b. Factory checkout and acceptance test of experiment and associated support systems.
- c. Payload integration tests of experiment and associated support systems with carriers.
- d. KSC prelaunch tests.

6.4 Spacecraft: The following major flight article ground tests will be performed on the AAP-1A CSM:

- a. Factory checkout and acceptance tests.
- b. Qualification tests for all AAP peculiar subsystems modifications to verify operation for the AAP-1A Mission.
- c. KSC prelaunch tests.

6.5 Prior Flight Missions: All launch vehicle and spacecraft test anomalies resulting from all previous missions which could degrade or interfere with primary objectives will be fully evaluated and corrected prior to the launch of AAP-1A.

- 6.6 Design Certification Review (DCR): An AAP DCR will be conducted to certify all new hardware and all changes from standard Apollo hardware required for this mission. Experiments likely to affect flight worthiness, manned flight safety or primary mission objectives will also be certified. Unmodified basic Apollo hardware already certified in previous DCR's will not be reviewed. The DCR shall be in accordance with Apollo Program Directive No. 6A (reference (e)) as to be modified for AAP.
- 6.7 Certification: A Certification of Flight Worthiness (reference (d)) for each stage and the spacecraft is required prior to shipment from the factory and after static firing if appropriate. In addition experiments whose failure would jeopardize crew safety (Category I) or the accomplishment of a primary mission objective (Category II) will also require preparation of a COFW. Final updated and signed COFW's by the program managers will be required at the Flight Readiness Review and close out of open items prior to launch will be in accordance with Apollo Program Directive No. 15 (reference (f)) as to be modified for AAP.

7.0 RELIABILITY AND QUALITY ASSURANCE

A Reliability and Quality Assurance Program will be conducted in accordance with the Reliability and Quality Assurance Plan (reference (g)) issued by SAA, R&QA, OMSF.

8.0 RESPONSIBILITIES

Center responsibilities for implementation of this mission are as follows:

8.1 MSFC:

- a. Provide the Up-rated Saturn I launch vehicle and required vehicle and GSE modifications.
- b. Conduct guidance and control dynamics analyses for the ground launched space vehicle configuration and develop the requisite launch vehicle guidance and control capability.

- c. Provide launch vehicle performance constraints, systems data and guidance support to MSC for mission planning.
- d. Provide technical support to KSC as required during the acceptance, modification, prelaunch checkout and launch phases of this mission.
- e. Provide operational support to MSC as required during AAP-1A launch operations.

8.2 MSC:

- a. Provide the CSM and associated GSE for the AAP-1A Mission.
- b. Develop assigned experiments, supporting hardware and associated GSE.
- c. Establish EVA requirements.
- d. Integrate experiments designated for transport in the AAP-1A GSM.
- e. Plan the mission to include mission design and develop the astronaut flight plan.
- f. Plan and execute flight control, experiment and recovery operations.
- g. Train the astronaut crew.
- h. Provide technical support to KSC as required during the acceptance, modification, checkout, prelaunch and launch phases of this mission.

8.3 KSC:

- a. Prepare the GSE and conduct prelaunch checkout of the launch vehicle.
- b. Prepare the GSE and conduct prelaunch checkout of the spacecraft and experiment hardware for AAP-1A.
- c. Install MSC and MSFC supplied kits and conduct modifications to Apollo hardware as required for execution at the launch site.
- d. Plan and execute space vehicle launch operations.
- e. Provide technical support as required to MSC and MSFC concerning the KSC implementation of modifications to flight hardware and GSE hardware.

9.0 IMPLEMENTATION

MSC, MSFC and KSC shall develop Mission Requirements documents to implement the requirements stated herein. The MSC and MSFC requirements will be combined in a jointly signed-off directive.

Subsequent changes and future revisions to center Mission Requirements documents noted above which conflict with the requirements stated herein will require coordination between the centers and the review and approval of the Saturn Apollo Applications Program Director. Other revisions to center Mission Requirements documents will be coordinated between centers as required with ten copies submitted to the Director, Saturn Apollo Applications Program, Code ML, for information.

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MT/Trimble (9)
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ML-1/Levenson (2)
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RP/Tischler
RV/Ames
RE/Sullivan
RN/Woodward
RND/Deputy Director
RNV/Novik (5)

OTDA

T/Buckley
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TA/Morrison
TS/Pozinsky
TR/Bryant

OPPA

PT/Maggin

GSFC

500/Covington
512/Roberts
513/Vonbun

KSC

AA/Debus
AB/Siepert
GA/VanStaden
XA/Hock
XC/Raffaelli (60)
HA/Petrone
DA/Mathews
CA/Murphy
MA/Bagnulo
MA/Clark
RA/Parker

MSC

AA/Gilruth
AB/Deputy Director
AD/West
KA/Thompson (50)
PA/Low
EA/Faget
TA/Piland
ET/Stoney
FA/Kraft (2)
GA/Slayton
AH/Berry
FA4/Fielder

MSFC

DIR/von Braun
DEP-T/Rees
EX/Maus
I-DIR/O'Connor
I-DIR/Mrazek
I-MO/Speer
I-S/AA-MGR/Belew (5)
I-S/AA/Ferguson
I-S/AA/Ise
I-S/AA/Reinartz
I-S/AA/Clingman
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(Data Manager)

MSC

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CB/Astronauts' Office (4)
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